

76 01923

DATA PROCESSING SYSTEM AUDIT REPORT

of the

PATTERN RECOGNITION AND INFORMATION CORRELATION SYSTEM  
(PATRIC)

Piper, C. Erwin  
Admin. Methods Data processing  
" " LA

INSTITUTE OF GOVERNMENTAL  
STUDIES LIBRARY

JUN 2 1976

by

UNIVERSITY OF CALIFORNIA

C. Erwin Piper  
City Administrative Officer

March, 1976

76 01923

INSTITUTE OF GOVERNMENTAL  
STUDIES LIBRARY

FEB - 8 2024

UNIVERSITY OF CALIFORNIA

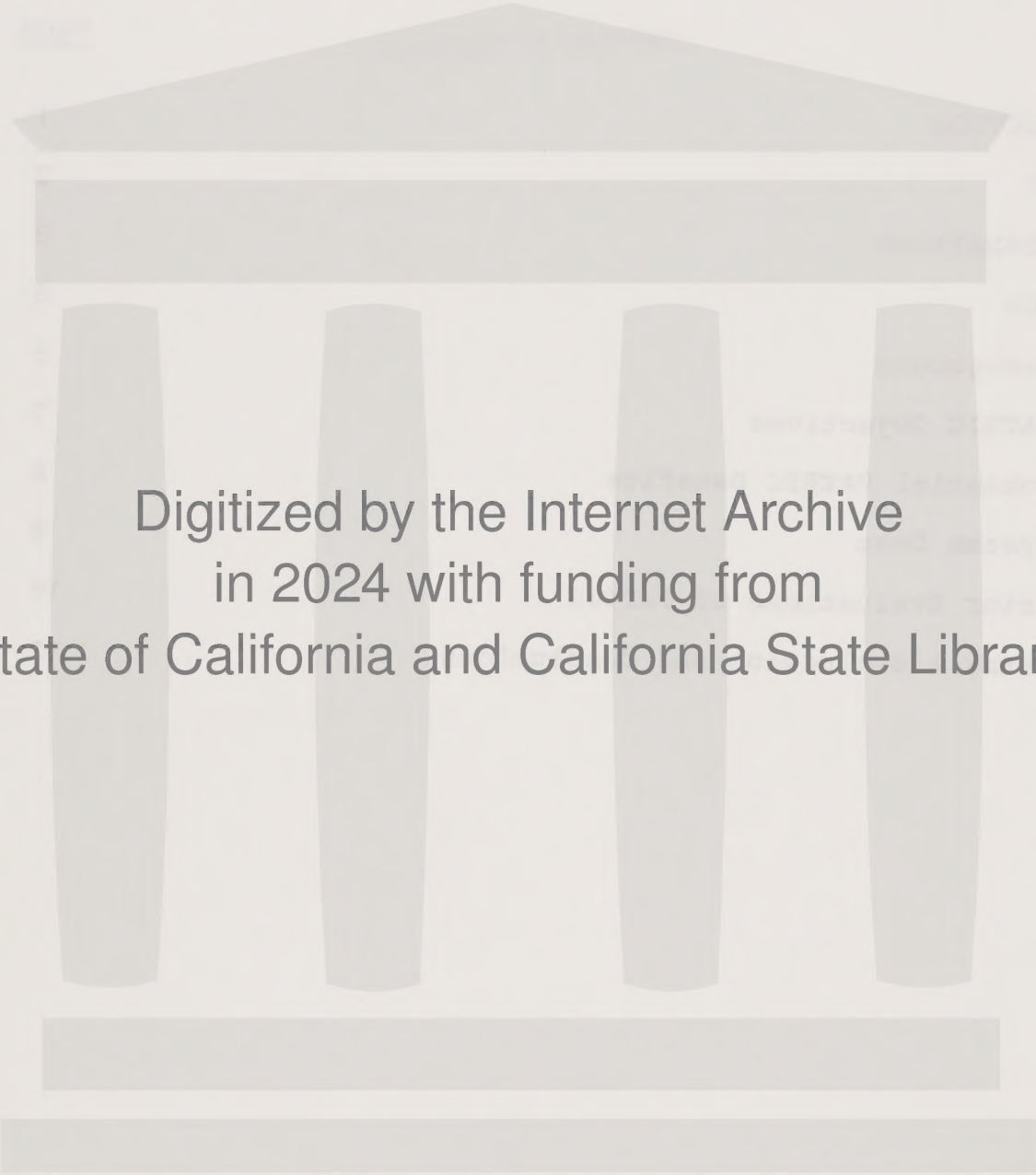
INSTITUTE OF GOVERNMENTAL  
STUDIES LIBRARY

JUN 5 1984

UNIVERSITY OF CALIFORNIA

## TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
SUMMARY	2
RECOMMENDATIONS	3
FINDINGS	5
Background	5
PATRIC Objectives	7
Potential PATRIC Benefits	8
System Cost	9
Prior Evaluations of PATRIC	10
Overall Evaluation and Conclusions	12



Digitized by the Internet Archive  
in 2024 with funding from  
State of California and California State Library

<https://archive.org/details/C124883109>



## INTRODUCTION

This is another in a series of reports on the audit of the City's data processing systems. The System covered in this audit report is the computerized police information system known as the Pattern Recognition and Information Correlation System (PATRIC). The PATRIC concept was conceived in 1965.

PATRIC is intended to provide a system capable of manipulating large volumes of data rapidly and relaying significant information to users performing police functions. Specifically, the objectives are to detect crime patterns, correlate suspect and modus operandi information, and detect multiple occurrence elements.

In 1971, the Police Department received a Federal grant to define, design, and implement the PATRIC System. The final grant funded development phase was concluded on June 30, 1975.

In conducting this audit, historical development documentation was reviewed, computerized test operations were observed, and personnel in the Police Department and the Data Service Bureau were interviewed. The cooperation of these individuals is acknowledged.

This report has been reviewed by the General Manager, Data Service Bureau who concurs with the findings and recommendations. The report has also been reviewed by the Chief of Police who concurs with the greater portion of the report but is opposed to evaluating the system in a centralized mode and without the support of the Data Entry System (DES) which will make computer-accessible crime report data available within 24 to 48 hours of crime reporting. The Chief believes that any evaluation of PATRIC should be postponed until the system has been decentralized and supported by implementation of the DES - which will not occur until the latter part of 1976.

Since the Data Entry System is not currently available, and since it primarily affects PATRIC support for uniformed services, we realize that this portion of the testing must be delayed. However, because of the high ongoing cost to the City of operating the PATRIC System, we believe that the testing and evaluation of the MO correlation capability, which is primarily in support of the investigative function, and other testing and evaluation which can be conducted should proceed at this time.





## SUMMARY

This data processing system audit was conducted at the end of the third and final phase of a three-year Federal grant project to develop PATRIC. Some 13 years and \$6.5 million have been spent on this effort since it was first conceived. PATRIC has been a research project which has in several areas pushed the state-of-the-art application in software, hardware, and police use of information.

Even though some limited testing was done in the early seventies, the new and different version of the system software as it exists today remains untested. System requirements should be re-evaluated in view of current needs, and modifications made in the scope and major emphasis of the system. System benefits and costs have not been determined. The overall impact of PATRIC upon the City's computer resources and the resultant computer operating costs have not been determined. The City has hired a consulting firm to evaluate the adequacy of its computer resources, including determination of the impact of the PATRIC system.

Annual recurring costs to operate a City-wide system with 20 on-line terminals as the Department envisions will probably exceed \$1 million. It is very important that the PATRIC system be thoroughly tested and evaluated in an operational mode to determine benefits to investigators, uniformed services, and management and the overall cost of the system compared to alternative means of accomplishing the same tasks before the City makes a decision to assume the costs of an operational PATRIC system.





## RECOMMENDATIONS

It is recommended that the Chief of Police:

Make a thorough test and evaluation of PATRIC in an operational mode by authorizing the six PATRIC Analysts to access the PATRIC data base from the six on-line terminals in Parker Center for a six-month period. The test period to be determined in conjunction with the Data Service Bureau and the City Administrative Officer (CAO). Six months should be used for the actual test period, and then a comprehensive report should be prepared for transmittal to the CAO. There should be no system expansion until the evaluation has been completed and expansion approved by the Mayor and Council. Inmaking the test and evaluation:

1. Develop evaluation criteria to be used in the test. Criteria to be approved by the City Administrative Officer. The test and evaluation should include provision for the following:
  - a. Determining, in quantitative terms, a comparison of the results achieved and the cost of achieving the results using the PATRIC system and using alternative approaches in support of investigative functions, uniformed services functions, and in provision of management information.
  - b. Determining the impact of the PATRIC system upon the City's computer resources and upon the priorities of other on-line police systems in cooperation with the Data Service Bureau and the City's computer consultant.
  - c. Re-evaluating the need for the current operational requirement that PATRIC interface with the Front-End Computer System (FECS), considering alternate means of obtaining data from other files, and the cost and impact of the PATRIC/FECS interface upon both the PATRIC system and other police on-line systems.
  - d. Testing and evaluating the feasibility of retaining operation of the centralized Automated Field Interview System (AFIS) vs. incorporating AFIS into the PATRIC system.

2. After evaluating the benefits and costs of PATRIC compared to alternative means of providing support for investigative, uniformed, and management personnel, determine what the scope and major emphasis of the system should be. Identify those parts of PATRIC which should be retained, modified, or eliminated based upon performance and cost. In addition, a determination should be made of the cost to implement necessary changes to the system.



## FINDINGS

### Background

In 1965, the Police Department participated with a consultant in a design study to develop a Police information system. This early study resulted in a system design concept under which this information would be stored and processed in an on-line interactive computer-based system. An important element in the design concept was that the system would provide the user with the capability for analyzing and correlating the many different kinds of crimes and crime-related information. This element was named PATRIC -- Pattern Recognition and Information Correlation. It was to correlate information based on names and descriptions of people, locations of crimes, descriptions of vehicles, and methods of operation (modus operandi).

The development plan for PATRIC called for a three-step modular approach which would lead to implementation of a computerized police information processing system. During Step I, a computer-based operational test using current Police Department files was to be employed to test hypotheses relative to modus operandi (MO) and patrol deployment theory, and to determine the technical requirements for an operating system. Step II was to involve selection of a software system compatible with the operational environment of the Data Service Bureau. Implementation of a City-wide operating system on City equipment was to be realized during Step III.

The system development was financed primarily through Federal grant funds made available through the California Council on Criminal Justice and matching funds provided by the City.

Step I of the actual PATRIC development began on January 1, 1971, and was concluded on February 29, 1972. The testing during Step I was to be conducted in conformance with certain objectives and working hypotheses which were set forth in the Step I grant application document. The two hypotheses most critical to the success or failure of the PATRIC MO correlation capability, which were to be proved or disproved during Step I, were:

- (1) "PATRIC can determine correlations existing among suspect, MO, and property descriptors appearing in various types of records.



- (2) A hierarchy among the descriptors can be determined as far as their individual and group utility is concerned, and each descriptor can be assigned a relative weight corresponding to its degree of rarity."

Although some suggested correlation strategies for various types of crimes were mentioned in progress reports, and some minor changes were made in the descriptors on the crime report forms, these hypotheses were not validated during Step I or at any later stage of the project.

Because numerous problems were encountered during the first phase of the project, the testing of the basic theory was continued into Step II which extended from March 1, 1972 through August 31, 1972. In addition, various alternative design and development approaches were explored and the overall results of the test experiments were published during Step II. During Step II-A, from September 1, 1972 through June 30, 1973, a specific system design approach was selected, detailed systems specifications written, and hardware and software purchase specifications prepared.

Step III, the final phase of the project, extended from July 1, 1973 through June 30, 1975. During this period, competitive bidding was conducted to select a vendor to provide and implement the specified software system, required hardware was obtained, and the PATRIC system was tested on the City's computer equipment.

Twenty CRT terminals and printers were purchased with PATRIC grant funds and are tentatively designated to be operated as PATRIC terminals. One of the PATRIC system requirements is that this equipment interface with the Front-End Computer System (FECS) in the DSB which permits access to other City, County, State, and Federal crime files. The capability of interfacing PATRIC with FECS was demonstrated during Step III. However, on April 17, 1975, the Mayor placed a moratorium on new or expanded applications to FECS until it can be proven that the system is capable of handling all intended Police Department applications.

The software package for manipulation and retrieval of data for the PATRIC system was changed during Step III from the System Development Corporation's DS/3 System to IBM's National Military Command System Information Processing System (NIPS). This change resulted from the bidding process. Most of the requirements of this new System had been implemented as of June 30, 1975.

During May and June, 1975, IBM conducted training sessions for six terminal operators (PATRIC Analysts) on CRT terminals located in Parker Center. The Analysts were instructed in the file structure and content of the new PATRIC data base and developed query strategies for the retrieval of information using simulated requests. IBM

continued to make changes to further improve the System during the diagnostic services period extending through September 30, 1975.

### PATRIC Objectives

The general and specific objectives of PATRIC as stated in all of the Federal grant applications are the following:

"The ultimate objective of the PATRIC System is to provide an automated police information processing system capable of manipulating large volumes of data rapidly and relaying filtered information to users to support line operations performing the police function.

"Specifically, the improvements sought in current police information processing are:

#### I. Detection of Crime Patterns.

- A. Increase the quality and timeliness of data relating to crime frequencies by category and by location.
  - 1. Provide management with frequent updates of crime patterns or rates.
  - 2. Improve patrol deployment by identifying areas and time of day where significant deviations from the normal crime level expectancies are occurring.

#### II. Correlation of Suspect, Modus Operandi and Property Information.

- A. Rapidly identify all crimes perpetrated by the same suspect, rapidly identify all possible suspects bearing the same unique descriptors (and identify all pawned items which are stolen property)\*.
  - 1. Provide deployed radio cars with composite modus operandi and suspect information for those crimes which account for a significant deviation in the crime level in patrol areas.
  - 2. Provide the detective with all usable data in existing information files concerning the crime he is investigating, other crimes perpetrated by the same criminal, other identified persons who are possible suspects (and pawned items which were stolen in the course of the crime)\*.

\*The Step III grant application, January 23, 1973, eliminated these pawned items.

### III. Detection of Multiple Occurrence Elements.

- A. Automatically detect significantly high frequencies of recurring descriptors in various types of records, which are sufficiently unusual as to constitute an emergent pattern that would be of appreciable tactical or investigative value."

#### Potential PATRIC Benefits

The potential benefits of PATRIC as stated in the "PATRIC Design Requirements, Volume II: Research Results, July 17, 1972," p. 1-4, include:

"Significant savings in time that is spent at present in the manual searching and correlating of crime information.\*

"Significant improvement in the quality of the information that can be retrieved in terms of timeliness, completeness, organization, and relevance to patrol and investigative personnel.

"Significant improvement in the Department's ability to clear cases by more effectively identifying suspects and correlating suspects with uncleared cases."

\*Department personnel state that in some cases there is no manual searching and correlating of crime data.



System Cost

1. PATRIC Development Cost

	<u>Grant Funds</u>	<u>Matching Funds</u>		<u>Total</u>
		<u>Hard Match</u>	<u>In-Kind Match</u>	
First Year				
Grant				
1-01-71 to				
2-29-72				
(actual				
amounts)	\$ 617,346		\$ 489,773	1,107,119
Second Year				
Grant				
3-01-72 to				
6-30-73				
(actual				
amounts)	1,433,151	\$ 25,000	491,381	1,949,532
Third Year				
Grant				
7-01-73 to				
6-30-75				
(Budgeted				
amounts)	<u>1,777,435</u>	<u>254,295*</u>	<u>338,183</u>	<u>2,369,913</u>
TOTAL	\$3,827,932	\$279,295	\$1,319,337	\$5,426,564
Pre Grant				
Effort				
7-10-62 to				
12-31-70				
(actual				
amounts)				<u>1,101,670</u>
		TOTAL		\$6,528,234
2. <u>Estimated Annual Operating Cost of PATRIC</u>				\$ 984,000**

\*Includes \$148,119 of State funds.

\*\*Does not include data input costs or the costs of interfacing with the Front-End Computer System, updating of the data base, and batch processing costs. These costs cannot be determined at this time.

### Prior Evaluations of PATRIC

Because of the potential magnitude of both the development and operational phases of the PATRIC System, the City of Los Angeles contracted with the Aerospace Corporation to evaluate the concept as represented in the draft of the initial Federal grant application. The results of this evaluation were published in a report dated May 12, 1970. The report stated that the PATRIC project represented a significant departure in police investigative methods and that the extraction and correlation of crime information from a massive computerized data base through the use of sophisticated processing programs would demand advanced equipment and computer techniques. It is also stated and that the approach might be pushing feasibility to its limit. At this point in time, the Department anticipated that computer programs could be developed to automatically correlate the information. This concept was later determined to be impossible and was dropped in favor of personal interaction at the terminals to attain necessary correlation of information from various data bases.

The Aerospace Report further stated, "Major emphasis is placed on the solution of the problems associated with the acquisition, processing, and conversion of data from selected reports to be utilized during the test bed activity, instead of emphasizing the overall objectives of the project. These overall objectives should be the determination of system requirements and specifications leading to the initial implementation of the ultimate PATRIC system."

The firm of Arthur Young and Company also made a review of the PATRIC System. In their report of September, 1972, they outlined the design status of PATRIC and the progress to date, including an evaluation of the results of the test operation.

The conclusions reached from their analysis and review of PATRIC documentation were:

1. The PATRIC System has the potential to provide benefits to the investigative efforts of the Los Angeles Police Department.
2. The benefits of PATRIC have not yet been measured and research results to date do not provide the necessary data for generating an accurate measure of system benefits.
3. A system of the magnitude of PATRIC must show demonstrable benefits before the City commits the operating costs required.

The report further stated that the research efforts should be continued, but recommended that a more realistic test of the operating benefits of PATRIC be conducted before making a final decision to implement the System. The report recommended that another test be conducted in two divisions for two months using certain evaluation criteria in order to more realistically measure the contribution of the PATRIC System to the performance and results of the Detective Bureau.

In accordance with the Arthur Young recommendations, the Department conducted tests at the Wilshire and Southwest Divisions from March 5 through April 21, 1973. The results of these tests were published in a June 15, 1973 report prepared by the PATRIC Project Advanced Systems Development Section entitled, "A Study of the Expanded Use of the Pattern Recognition and Information Correlation System,". The report states: "Overall, PATRIC has demonstrated that it does impact on crime rates and case clearance, but the exact extent of the impact can only be determined in an extended period of time in a closely controlled environment." The audit team agrees with the Departmental findings that the results of this test were inconclusive and that further testing and evaluation will be necessary.

In June, 1974, the Police Department prepared a report titled, "Los Angeles Police Department Pattern Recognition and Information Correlation Project Evaluation Plan." This report describes in considerable detail a plan to "initiate an extensive evaluation of the PATRIC System. This evaluation will cover a period of six months of on-line terminal operation and will analytically examine the effectiveness of the system as a tool for the operational areas of the Los Angeles Police Department." The 1974 report further refers to the seven-week examination of the PATRIC System mentioned in the preceding paragraph and states, "While that diagnosis was excellent in approach, it was hampered both by the brief time period and the fact that the system had not settled down to a routine operation. Because of these problems, the City Administrative Officer has requested a more extensive evaluation of the PATRIC System." The audit team agrees with this conclusion.



## Overall Evaluation and Conclusions

June 30, 1975, marked the end of the third and final grant funded phase of the PATRIC development project. However, as of that date, a system requirement the Department believes to be critical for successful operation had not been accomplished, namely the 24 hour update capability of the data base (TM-L-4953-1, System Requirements, July 17, 1972). Furthermore, the benefits of the System to the Department and its cost effectiveness had not been determined, and the impact of an operational PATRIC System upon the City's computer resources and upon the priorities of other on-line Police systems was unknown.

PATRIC was designed to provide support for uniformed services, investigators, and management. The initial objectives of the system were to process crime and related reports in a more economical, timely, and effective basis than had been done in the past.

The "PATRIC System Requirements, TM-L-4953-1," page I-7, states the following: "Finally, it should be noted that the system requirements analysis is a process that continues throughout development and operations. The system designer and system user must continually evaluate requirements with respect to performance and cost, making appropriate trade-offs and changes as the dynamic process of implementation and operation occurs."

During previous tests of the PATRIC System, much of the useful information supplied to investigative personnel was due to the inclusion of the field interview information in the PATRIC data base. Since the Automated Field Interview System (AFIS) has been operating successfully for several years, a question arises as to whether it may be advisable to retain this as a separate system rather than to have it combined with PATRIC. Some important field interview information is not included in the PATRIC data base and the interactive query time is slower using the PATRIC System. Parallel testing and evaluation of requests through both the PATRIC System and AFIS should be conducted before a decision is made to discontinue the separate AFIS.

Further verification should be made of the current requirement for a decentralized operation and for providing PATRIC terminals staffed with PATRIC Analysts in all seventeen area stations and in three headquarter locations. Until a comprehensive test of the System in an operational mode is conducted, the need, cost, and effectiveness of this approach cannot be determined.

The expressed reason for locating PATRIC terminals in each area station is that there is a need for close personal interaction between the investigators using the system and the PATRIC Analysts.



On the other hand, there is much to be said for a centralized operation. The operation of the Automated Field Interview System is an example.

An excellent working relationship has been established between the investigators in the area stations throughout the City and the personnel in the centralized AFIS Unit in Parker Center. Investigators and the AFIS personnel discuss each request by telephone. Some requests are processed through interactive queries using three on-line terminals, and others are prepared for batch processing at a later time. A successful working relationship of this type could also be established between investigators and the PATRIC Analysts.

Use of a centralized PATRIC operation will facilitate training and the development of more efficient query strategies. In addition, a higher level of service can be maintained through centralization. The operation of PATRIC terminals is very specialized, and there has been 100 per cent turnover of PATRIC Analysts in the past year. Several Analysts will always be available to process City-wide requests in a central location, but without provision of a relief factor, Analysts will be absent from area stations some of the time.

In addition to determining the number of terminals for an effective operation, provision must be made for the most appropriate and cost effective mix between on-line and batch processing of PATRIC requests.

The most current information in the PATRIC crime data base is five to seven days old. It will be difficult to achieve the 24-hour update requirement for PATRIC files. In view of this, and the fact that much of the information which is to be generated by PATRIC reports is presently being supplied on a timely basis by the Area Analytical Units, the benefit of providing this information through automated PATRIC reports with five to seven day old data should be re-evaluated. The Department believes it can provide data no older than 36 hours, however.

A potential strength of the NIPS software system, i.e., the information retrieval and report generating capabilities, should perhaps be used to a greater advantage for producing both routine and special reports for management. In this regard, the Department has requested that certain statistical reports and other special management reports produced by the Management Services Division with another system be produced using the NIPS software system.

There have been indications of potentially serious problems in implementing the new software on the City's computer equipment.



During the Analyst training period in Step III, the use of the six on-line terminals in Parker Center had a significant impact upon the computer resources of Computer System B in the Data Service Bureau. Excessively high response times were experienced during much of the Step III training period. This was partially due to the low priorities assigned PATRIC.

On May 29, 1975, for example, a demonstration of PATRIC was conducted at the six terminals in Parker Center. Unfortunately, it was impossible to get a single file search completed due to the low priority assigned to the System at that time. PATRIC Analysts stated that on numerous other occasions the time to complete initial query responses was high -- sometimes as high as 45 minutes. Some changes have subsequently been made which have reduced average initial response time.

In September, 1975, an additional CPU memory unit was added to System A and PATRIC was switched to that System. The impact of PATRIC upon computer resources and upon the priorities of the other on-line Police systems running on System A is unknown at this time. The ultimate impact will be dependent upon a number of factors, including file size, file design, frequency of updating the data base, query strategy used by PATRIC Analysts, and the number of on-line terminals being operated in the PATRIC System. Decisions have yet to be finalized regarding most of these matters. Because the overall requirements of an operational PATRIC System are not known, the total impact of the System on DSB resources and the resultant computer operating costs cannot be determined at this time. For this reason, the estimate of annual recurring operating costs mentioned in this report must be considered tentative. A consulting firm has recently been hired to evaluate the adequacy of the City's computer resources, including determination of the impact of the PATRIC system.

Testing to date has been limited, and test results inconclusive. Annual recurring costs to operate a City-wide system with 20 on-line terminals as the Department envisions will probably exceed \$1 million. PATRIC should be tested and evaluated in an operational mode to determine:

- (1) Benefits to investigators, uniformed services, and management, and

- (2) The overall cost effectiveness of the System compared to alternative approaches.

This should be done before the City makes a decision to assume the on-going costs of an operational PATRIC System. Final decisions can then be made regarding the scope of the PATRIC System.



The evaluation of the currently proposed PATRIC System should consider the following:

- Some operating requirements have not been fully achieved, and all requirements should be reverified in view of current police operations, i.e., 24 hour update capability not accomplished, the need for PATRIC terminals in all areas, and advisability of discontinuing AFIS is questionable.
- The potential strengths of the current software and hardware system configuration may not be fully utilized, i.e., for production of statistical and special management reports.
- The potentially serious problems in implementing the new software on the City's computer equipment, i.e., effect of the proposed 20 on-line terminals on computer resources, FECS, and other on-line police systems.

In conjunction with the test and evaluation, the Department should re-evaluate its overall information system needs and modify the scope and major emphasis of the PATRIC System to enable the Department to best achieve these needs.

C124883109

INSTITUTE OF GOVERNMENTAL

INSTITUTE OF GOVERNMENTAL  
STUDIES LIBRARY

FEB - 8 2024

UNIVERSITY OF CALIFORNIA